

C L A I M S

1 - Process for producing silane crosslinked (cured) polyethylene in which  
5 a polyethylene is grafted with a silane comprising at least one ethylenic double bond to a silane crosslinkable polyethylene which is then subjected to a crosslinking (curing) step, characterized in that the process comprises the following process steps:

- 10 a) a sample is taken from the silane crosslinkable polyethylene before the curing step,
- b) the sample is processed into a film,
- c) the film is analyzed by Infrared Spectroscopy,
- d) a predefined area of the IR spectrum is determined and
- 15 e) the area determined in step d) is correlated with the gel content in the silane crosslinked polyethylene after the curing step using a predetermined regression curve.

2 - Process according to claim 1, wherein the polyethylene is a polyethylene homopolymer or a copolymer of ethylene and at least one other olefin.

20 3 - Process according to claim 2, wherein the other olefin is selected from propylene, butene, octene, vinyl acetate, (meth)acrylate and mixtures thereof.

4 - Process according to any of claims 1 to 3, wherein the silane comprising at least one ethylenic double bond is a vinyl silane.

25 5 - Process according to claim 4, wherein the silane is selected from vinyltrimethoxysilane, vinyltriethoxysilane, vinylmethyldimethoxysilane and vinylmethyldiethoxysilane.

6 - Process according to any of claims 1 to 5, wherein the predefined area of the IR spectrum is the area starting at a wave number in the range from 1150

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$\text{cm}^{-1}$  to  $1205 \text{ cm}^{-1}$  and ending at a wave number in the range from  $1000 \text{ cm}^{-1}$  to  $1085 \text{ cm}^{-1}$ .

7 - Process according to any of claims 1 to 6, wherein the grafting of the polyethylene with a silane comprising at least one ethylenic double bond to a  
5 silane crosslinkable polyethylene is carried out in the presence of a free radical source.

8 - Process according to claim 7, wherein the free radical source is a peroxide, a diazo compound or radical generating irradiation.

9 - Process according to any of claims 1 to 8, wherein the silane  
10 crosslinked (cured) polyethylene is at least a part of a shaped product.

10 - Process according to claim 9, wherein in a first step the polyethylene is reacted with a free radical source and the silane to obtain granules of silane crosslinkable polyethylene and in a second step the granules of silane crosslinkable polyethylene are optionally mixed with a catalyst and formed into  
15 the shaped product which is then cured applying heat and water.

11 - Process according to claim 10, wherein the sample in step a) is taken from the granules of silane crosslinkable polyethylene.

12 - Process according to claim 7 to 11, wherein the regression curve used in step e) is obtained according to the following protocol:

20 A) samples of silane crosslinkable polyethylene are produced from polyethylene containing a standard concentration of free radical source and varying concentrations of silane,

B) samples of silane crosslinkable polyethylene are produced from polyethylene containing a standard concentration of the silane and varying  
25 concentrations of free radical source,

C) optionally samples of silane crosslinkable polyethylene are produced from polyethylene containing varying concentrations of free radical source and varying concentrations of silane,

D) each of the samples produced in A), B) and optionally C) above are  
30 cured, and the gel content of cured product is measured,

E) of each of the samples produced in A), B) and optionally C) above films of controlled thickness are obtained and subjected to IR spectroscopy,

5 F) from each of the spectra obtained in step E) above the spectrum of a sample which was produced without silane is subtracted, and the resulting spectra are normalized,

G) a predefined area of each of the normalized spectra is determined,

H) the areas of step G) are correlated with the gel content of the corresponding cured products obtained in step D) and the regression curve is calculated based on these data.

10 13 - Process according to claim 12, wherein in step A) one sample with a silane concentration of 0% and five or more samples with varying silane concentrations are produced.

14 - Process according to claim 12 or 13, wherein in step B) five or more samples with varying concentrations of free radical source are produced.

15 15 - Process according to any of claims 12 to 14, wherein step C) is carried out and five or more samples with varying concentrations of silane and free radical source are produced.

20 16 - Use of the following protocol for controlling the quality of shaped products of silane crosslinked polyethylene in a process in which polyethylene is reacted with peroxide and a vinylsilane at a high temperature to a silane crosslinkable polyethylene:

a) a sample is taken from the silane crosslinkable polyethylene,

b) the sample is processed into a film,

c) the film is analyzed by Infrared Spectroscopy,

25 d) a predefined area of the IR spectrum is determined and

e) the area determined in step d) is correlated with the gel content of a shaped product of silane crosslinked polyethylene using a predetermined regression curve.